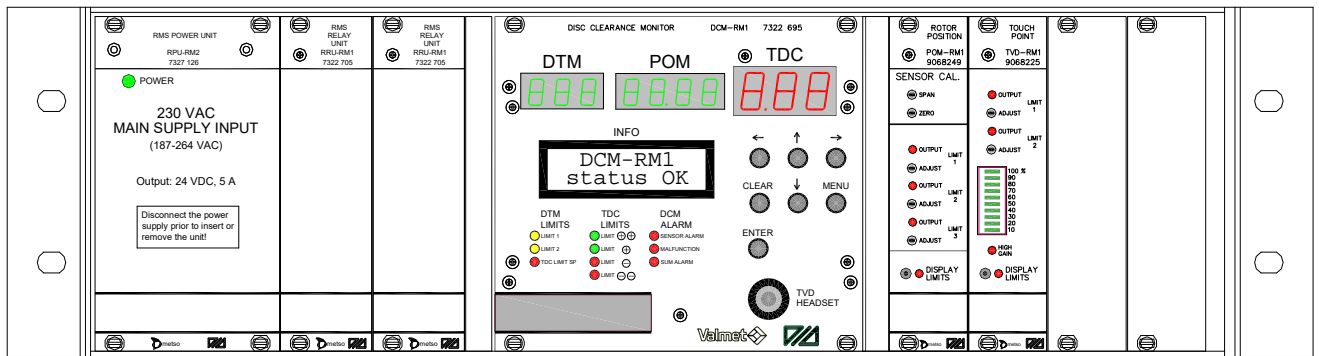




# RMS-RS1

VAL0130889 / SKC7322671



## REFINER MONITOR SYSTEM – RS REPLACEMENT SYSTEM USER’S MANUAL



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## 1 GENERAL

The RMS-RS1 is intended as a replacement for the DCA-02 as an amplification unit for the TDC sensor.

The unit contains supply devices for 115 or 230 VAC, relay cards for galvanised isolation of the digital outputs and units for the following measurement functions:

- Disc clearance and disc temperature measurement.
- Rotor position measurement.
- Touch point measurement.

Each measurement unit has a galvanically isolated current output, 4-20 mA.

The unit has LED displays for these measurement functions that provide good readability in the field.

The RMS-RS1 can also be complemented with two of the following measurement functions:

- Temperature measurement.
- Hydraulic pressure measurement.
- Motor power measurement.
- Vibration measurement.

For sensor calibration and alarm limits adjustment, refer to the calibration manual, KAL-RS1.

For parameter programming, refer to the programming manual, PRO-RS1.

## 2 REVISIONS

Jan. 20, 2010. Alarm limit DTM-3 has been removed for the addition of a 5th TDC limit. DCM-RM1 with software version 1.63 and later has this new feature.

### 3 TECHNICAL DATA

Supply voltage:	115VAC / 230VAC, selectable, 47...63 Hz
Fuse:	Automatic fuse, 2 A
Ambient temperature:	0 - 55 °C
Storage temperature:	- 40 to +70 °C
Humidity:	H in accordance with DIN 40 040 (15% to 95% non-condensing)
Protection class:	IP00 (no protection from dust or water)
Fitting:	Fitted, with four M6 screws, to a vertical mounting plate with sealed encapsulation
Relay outputs:	Single-pin Relay contacts, max. voltage: 230 VAC, max. current: 8 A
Digital outputs:	Voltage: 24 VDC, type: PNP output from +24 V system voltage isolation: 500 V, galvanically isolated from each unit load: max. 50 mA
Digital inputs:	Voltage: 24 VDC, isolation: 500V, galvanically isolated from each unit, input impedance: 5 k $\Omega$ , switchover level: 12 $\pm$ 5 V
Analogue outputs:	4-20 mA, isolation: 500 V, galvanically isolated, load: max. 800 $\Omega$
Analogue inputs:	4-20 mA, isolation: $\pm$ 200 V to each unit, input resistance: max. 200 $\Omega$
Connecting cables:	Signals: Plug-in screw terminals, max. 2.5mm <sup>2</sup> cable area Shielding: Connects to ground plate under the rack Grounding: The rack is grounded via the ground connector (and via the mounting brackets)
Interface:	RS-232 for program upgrades CAN for communication with the RCS (Refiner Control System)
CE approval:	In accordance with EN 50081-2:1993, EN 50082-2:1995, 89/336/EEC

## 4 FUNCTIONS

### 4.1 STANDARD UNITS

The following standard units shall always be used.

<b>4.1.1 RMS-RS1</b>	<b>Rack RMS-RS</b>
Internal connector:	32-pin and 64-pin PCB connector, type C
External connector:	4, 6, 8 and 12-pin plug-in screw terminals
Interface 1:	RS-232 for software upgrades
Interface 2:	CAN for future expansion
<b>4.1.2 RPU-RM1</b>	<b>RMS POWER UNIT (for 115 VAC)</b>
Function:	Generates 24 VDC supply voltage
Supply voltage:	115 VAC (93-132 VAC), 47...63 Hz
Output:	+24 VDC, max. 5.0 A
<b>4.1.3 RPU-RM2</b>	<b>RMS POWER UNIT (for 230 VAC)</b>
Function:	Generates 24 VDC supply voltage
Supply voltage:	230 VAC (187-264 VAC), 47...63 Hz
Output:	+24 VDC, max. 5.0 A
<b>4.1.4 RRU-RM1</b>	<b>RMS Relay Unit</b>
Function:	Transforms 24 VDC digital outputs into potential-free relay connectors
Digital inputs:	8, 24 VDC
Relay outputs:	8, single-pin Relay connectors, max. volt.: 230 VAC, max. current: 8 A
Card 1 (left)	Terminals K15 and K16
Card 2 (right)	Terminals K13 and K14

<b>4.1.5 DCM-RM1</b>	<b>Disc Clearance Monitor</b>
Function:	Measures true disc clearance (TDC) and disc temperature (DTM)
Display:	17mm 3-digit LED display for TDC 13mm 3-digit LED display for DTM 13mm 4-digit display for POM (rotor position) Information display, 2 rows of 16 characters using backlit LCD technology. Five 3mm LED indicators for TDC alarm limits Two 3mm LED indicators for DTM alarm limits Three 3mm LED indicators for DCM alarm indication
Digital inputs TDC:	5, for external switch for TDC calibration
Digital outputs TDC:	6 outputs, TDC ++, TDC +, TDC -, TDC - -, TDC SP, TDC SA (sensor alarm). These outputs are internal to the rack, connected to the RRU-RM1 relay card
Digital outputs DTM:	2 outputs, DTM1, DTM2. These outputs are internal to the rack, connected to the RRU-RM1 relay card
Digital outputs DCM:	1 output, DCM-MF (malfunction). This output is internal to the rack, connected to the RRU-RM1 relay card
Analogue output TDC:	4-20 mA
Analogue output DTM:	4-20 mA
External sensor:	TDC sensor
External cables:	K-TDC25, 7-conductor cable + double shielding, 0.75 mm <sup>2</sup> , 25m
	and
	KB-02 Junction box
	and
	K-GTS, 7-pin contact, 7-conductor cable + shielding, 0.75 mm <sup>2</sup> , 3 m
<b>4.1.6 POM-RM1</b>	<b>Position Monitor</b>
Function:	Measures rotor position
Digital outputs:	Limit 1, Limit 2, Limit 3
Analogue output:	4-20 mA
External sensor:	POT-50
External cable:	K-POT25, 7-pin contact, 7-conductor cable + shielding, 0.25 mm <sup>2</sup> , 25 m
<b>4.1.7 TVD-RM1</b>	<b>Touchpoint Vibration Detector</b>
Function:	Measures touch point vibration
Digital input:	Low amplification
Digital outputs:	Limit 1, Limit 2
Analogue output 1:	4-20 mA
Analogue output 2:	Audio signal to Headset
Analogue output 3:	Reserve
Display:	LED column at the front, 0-100%, 10 LEDs
External sensor:	TVD-T1, TVD-T2 or TVD-T2S
External cable:	K-TVDS25, 4-pin contact, 4-conductor cable + shielding, 0.25 mm <sup>2</sup> , 25 m, protected

## 4.2 OPTIONAL UNITS

One or two of the following units can also be placed in the two card slots to the far right of the rack. The units' digital outputs shall be isolated by connection to the relay modules mounted on the DIN plate. Analogue outputs are galvanically separated and can be directly connected to any unit.

<b>4.2.1 VIM-RM1</b>	<b>Vibration Monitor</b>
Function:	Measures vibration
Digital outputs:	Limit 1, Limit 2
Analogue output:	4-20 mA
Display:	LED column at the front, 0-25 mm/s, 10 LEDs
External sensor:	VIM-T2, Accelerometer 1 to 6000 Hz
External cable:	K-VIMS25, 2-pin contact, 4-conductor cable + double shielding, 0.25 mm <sup>2</sup> , 25m
<b>4.2.2 MPM-RM2</b>	<b>Motor Power Monitor</b>
Function:	Measures main motor power
Digital outputs:	Limit 1, Limit 2, Limit 3
Analogue input:	4-20 mA
Analogue output:	4-20 mA
<b>4.2.3 HPM-RM1</b>	<b>Hydraulic Pressure Monitor</b>
Function:	Measures A and B chamber pressure
Digital outputs:	A Limit 1, A Limit 2, B Limit 1, B Limit 2
Analogue outputs:	A: 4-20 mA, B: 4-20 mA
External sensor:	Two double-conductor Pressure transmitters 4-20 mA.
<b>4.2.4 OTM-RM1</b>	<b>Optional Temp Monitor</b>
Function:	Excites and measures 2 sensors for temperature measurement. This unit can be set for 0-100°C or 0-200°C (with DIP switch)
Function:	Measures temperature, 2 channels
Digital outputs:	CH1: Limit 1, Limit 2, CH2: Limit 1, Limit 2
Analogue outputs:	CH1: 4-20 mA, CH2: 4-20 mA
External sensor:	Two triple-conductor PT100 sensors
<b>4.2.5 DXM-DM1</b>	<b>Digital Expansion Module</b>
Function:	Ger extra digitala utgångar för t-ex övervakning av FeedGuard.
Digital in and outputs:	8 channels which can be configured as input or output. This is set in the host unit, DCM-RM1.
	The outputs are PNP-type with 24VDC supply voltage.
Supply:	The unit is powered by 24VDC from the RMS-RS1 rack.

**5 RMS CENTRAL UNIT**

The DCM-RM1 unit has functions for disc clearance measurement and disc temperature measurement, but also functions as a central unit for the RMS-RS1 measuring system.

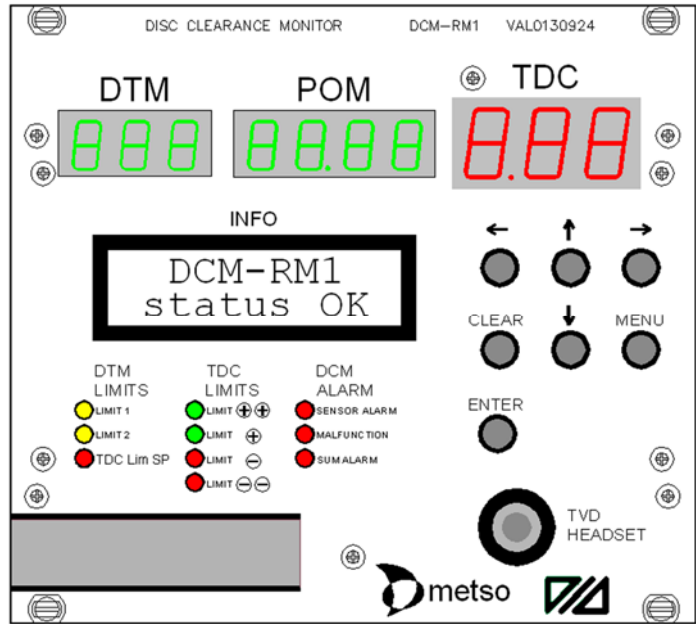
The unit contains a monitoring function for the other RMS units, as well as switches and a display for calibration, parameter settings, and alarm management.

**Calibration**

For sensor calibration, see the calibration manual (KAL-RS1), which provides a detailed description of each calibration. The manual also explains how to set the system alarm limits.

**Programming**

For parameter programming, refer to the programming manual (PRO-RS1), which describes this subject in detail.



**5.1 RMS INTERFACE**

The DCM-RM1 functions as a service display for the other RMS units in the system and is activated when “DISPLAY LIMITS” is pressed on one of the RMS units. The display shows the unit’s measured values and alarm limit settings.

If, for example, DISPLAY LIMITS on POM-RM1 is pressed, the following is shown:

```
POM=50.00 mm  D
1=25.00 2=50.00>
```

If the unit cannot be detected in the RMS interface, the following is shown:

```
RMS ID error
U=X.XX V
```

**5.2 ALARM MANAGEMENT**

In case of an abnormal signal level in one of the RMS units, a sum alarm is activated, which is indicated on the display.

In case of alarm, an LED lights and the relay output for the sum alarm drops. When the malfunctioning units begin to function again, the LED goes out and the relay is reactivated.

```
Sum Alarm
TVD, POM
```



## 6 CONNECTION STANDARD UNITS

K1 to K4 are intended for expansion units and where different alternatives can be used. For connecting these, refer to the end of this chapter.

### 6.1 K5, TVD Cable K-TVDS25 from TVD sensor

T+TVD	1 ●	Sensor, positive	K-TVDS25 : white+brown
T-TVD	2 ●	Sensor, negative	K-TVDS25 : green+yellow
TS-TVD	3 ●	Cable shield connects to the ground plate under the rack	
GND	4 ●	Signal ground (not used)	

### 6.2 K6, TVD, POM, Analogue outputs, digital inputs and outputs

AO+POM	1 ●	Analogue output POM,+ 4-20 mA	POM
AO-POM	2 ●	Analogue output POM, -, 4-20 mA	POM
AO+TVD	3 ●	Analogue output TVD,+ 4-20 mA	TVD
AO-TVD	4 ●	Analogue output TVD, -, 4-20 mA	TVD
AO+TVDH	5 ●	Analogue output TVD,+ Headset	TVD-Headset
AO-TVDH	6 ●	Analogue output TVD, -, Headset	TVD-Headset
DI+LGA	7 ●	Digital input, TVD Low amplification TVD	
GND	8 ●	Signal ground (not used)	

### 6.3 K7, CAN bus communication port

CAN-H	1 ●	CAH-H
CAN-L	2 ●	CAN-L
CAN-R	3 ●	CAN-R, jumper pin to CAN-L if final resistance is required
GND	4 ●	Signal ground (not used)

### 6.4 K8, POM, Cable K-POT25 to rotor position sensor POT-50

TI-POT	1 ●	Sensor, input positive	K-POT25: white
TI+POT	2 ●	Sensor, input negative	K-POT25: brown
TE-POT	3 ●	Sensor, input common	K-POT25: green
TE+POT	4 ●	Sensor (not used)	K-POT25: yellow
TR+POT	5 ●	Sensor, exciting positive	K-POT25: grey
TM+POT	6 ●	Sensor, exciting negative	K-POT25: pink
TS-POT	7 ●	Cable shield connects to the ground plate under the rack	
GND	8 ●	Signal ground (not used)	

### 6.5 K9, DCA, Digital inputs for TDC sensor calibration

DI+DCASC	1 ●	Digital input, DCA Basic setting	Cal. Switch
DI+DCASS	2 ●	Digital input, DCA Amplification setting	Cal. Switch
DI+DCASZ	3 ●	Digital input, DCA Zero setting	Cal. Switch
DI+DCASE	4 ●	Digital input, DCA Set/Calibration method	Cal. Switch
US+	5 ●	+24V Supply voltage for ext. switch	Cal. Switch
GND	6 ●	Signal ground for ext. switch/logic	

### 6.6 K10, DCA, DTM, Analogue outputs for TDC and DTM signals

AO+DCA	1 ●	Analogue output TDC,+, 4-20 mA	TDC
AO-DCA	2 ●	Analogue output TDC, -, 4-20 mA	TDC
AO+DTM	3 ●	Analogue output DTM,+, 4-20 mA	DTM
AO-DTM	4 ●	Analogue output DTM, -, 4-20 mA	DTM

### 6.7 K11, RS-232 Serial communication port for program upgrades

Warning. Do not connect the data cable to this contact during operation. This can cause the unit to reset.

### 6.8 K12, DCA, Cable K-TDC25 to junction box KB-02

TM+TDC	1 ●	TDC Sensor, measuring positive	K-TDC25 : white
TM-TDC	2 ●	TDC Sensor, measuring negative	K-TDC25 : brown
TR+TDC	3 ●	TDC Sensor, reference positive	K-TDC25 : green
TR-TDC	4 ●	TDC Sensor, reference negative	K-TDC25 : yellow
TE+TDC	5 ●	TDC Sensor, exciting positive	K-TDC25 : grey
TE-TDC	6 ●	TDC Sensor, exciting negative	K-TDC25 : pink
TP+TDC	7 ●	TDC Sensor, pt-100 exciting	K-TDC25 : blue
TS-TDC	8 ●	Inner cable shield connects to this terminal	

Outer cable shield connects to ground plate

### 6.9 K13, Closing relay outputs for external control system

DCA1+	1	●	TDC, Alarm limit ++
DCA1-	2	●	TDC, Alarm limit ++
DCA2+	3	●	TDC, Alarm limit +
DCA2-	4	●	TDC, Alarm limit +
DCA3+	5	●	TDC, Alarm limit -
DCA3-	6	●	TDC, Alarm limit -
DCA4+	7	●	TDC, Alarm limit - -
DCA4-	8	●	TDC, Alarm limit - -

### 6.10 K14, Closing relay outputs for external control system

DTM1+	1	●	DTM, Alarm limit 1
DTM1-	2	●	DTM, Alarm limit 1
DTM2+	3	●	DTM, Alarm limit 2
DTM2-	4	●	DTM, Alarm limit 2
DCA SP+	5	●	DCA, Alarm limit SP
DCA SP-	6	●	DCA, Alarm limit SP
SEN+	7	●	TDC, Alarm limit Sensor Alarm
SEN-	8	●	TDC, Alarm limit Sensor Alarm

### 6.11 K15, Closing relay outputs for external control system

MFU+	1	●	DCM Alarm limit Malfunction
MFU-	2	●	DCM Alarm limit Malfunction
SUM+	3	●	DCM Alarm limit Sum Alarm
SUM-	4	●	DCM Alarm limit Sum Alarm
POM1+	5	●	POM, Alarm limit 1
POM1-	6	●	POM, Alarm limit 1
POM2+	7	●	POM, Alarm limit 2
POM2-	8	●	POM, Alarm limit 2

### 6.12 K16, Closing relay outputs for external control system

POM3+	1	●	POM, Alarm limit 3	
POM3-	2	●	POM, Alarm limit 3	
TVD1+	3	●	TVD, Alarm limit 1	
TVD1-	4	●	TVD, Alarm limit 1	
TVD2+	5	●	TVD, Alarm limit 2	
TVD2-	6	●	TVD, Alarm limit 2	
RS1+	7	●	RS1, Alarm limit 1	Optional unit 1
RS1-	8	●	RS1, Alarm limit 1	

### 6.13 K17, Supply voltage (115-230VAC)

LIVE	1	●	PHASE	115 or 230 VAC	Note: Check the voltage on selected RPU unit
NEUTRAL	2	●	ZERO		
GND	3	●	PROTECTIVE GROUND		
GND	4	●	PROTECTIVE GROUND (K17/3 and K17/4 connected internally)		

## 7 CONNECTION OPTIONAL UNITS

Card slots RS1 and RS2 are identical regarding connecting. This means that an RMS card can be placed in either slot. The following are examples of how the RMS cards are connected.

### 7.1 K1/K3, VIM unit connected to slot RS1 or RS2

T1-RSx	1 ●	VIM-Sensor, positive	K-VIMS25: white+brown
T2-RSx	2 ●	VIM-Sensor, negative	K-VIMS25: green+yellow
T3-RSx	3 ●	Not used	Inner cable shield shall be
T4-RSx	4 ●	Not used	Isolated and unconnected
T5-RSx	5 ●	Not used	
T6-RSx	6 ●	Not used	

Outer cable shield connects to ground plate

### 7.2 K2/K4, VIM unit connected to slot RS1 or RS2

AO1+RSx	1 ●	Analogue output VIM +, 4-20 mA
AO1-RSx	2 ●	Analogue output VIM -, 4-20 mA
AO2+RSx	3 ●	Not used
AO2-RSx	4 ●	Not used
DO+Rx1	5 ●	Not used
DO+Rx2	6 ●	Not used
DO+Rx3	7 ●	Digital output VIM, Limit 1
DO+Rx4	8 ●	Digital output VIM, Limit 2

### 7.3 K1/K3, MPM unit connected to slot RS1 or RS2

T1-RSx	1 ●	Analogue input MPM +, 4-20 mA
T2-RSx	2 ●	Analogue input MPM -, 4-20 mA
T3-RSx	3 ●	Not used
T4-RSx	4 ●	Not used
T5-RSx	5 ●	Not used
T6-RSx	6 ●	Not used

#### 7.4 K2/K4, MPM unit connected to slot RS1 or RS2

AO1+RSx	1	●	Analogue output MPM +, 4-20 mA
AO1-RSx	2	●	Analogue output MPM -, 4-20 mA
AO2+RSx	3	●	Not used
AO2-RSx	4	●	Not used
DO+Rx1	5	●	Not used
DO+Rx2	6	●	Digital output MPM, Limit 3
DO+Rx3	7	●	Digital output MPM, Limit 1
DO+Rx4	8	●	Digital output MPM, Limit 2

#### 7.5 K1/K3, HPM unit connected to slot RS1 or RS2

T1-RSx	1	●	Sensor A chamber, positive
T2-RSx	2	●	Sensor A chamber, negative
T3-RSx	3	●	Cable guard connects to ground plate under rack
T4-RSx	4	●	Sensor B chamber, positive
T5-RSx	5	●	Sensor B chamber, negative
T6-RSx	6	●	Cable shield connects to ground plate

#### 7.6 K2/K4, HPM unit connected to slot RS1 or RS2

AO1+RSx	1	●	Analogue output channel 1 +, 4-20 mA
AO1-RSx	2	●	Analogue output channel 1 -, 4-20 mA
AO2+RSx	3	●	Analogue output channel 2 +, 4-20 mA
AO2-RSx	4	●	Analogue output channel 2 -, 4-20 mA
DO+Rx1	5	●	Digital output, channel 1, Limit 1
DO+Rx2	6	●	Digital output, channel 1, Limit 2
DO+Rx3	7	●	Digital output, channel 2, Limit 1
DO+Rx4	8	●	Digital output, channel 2, Limit 2

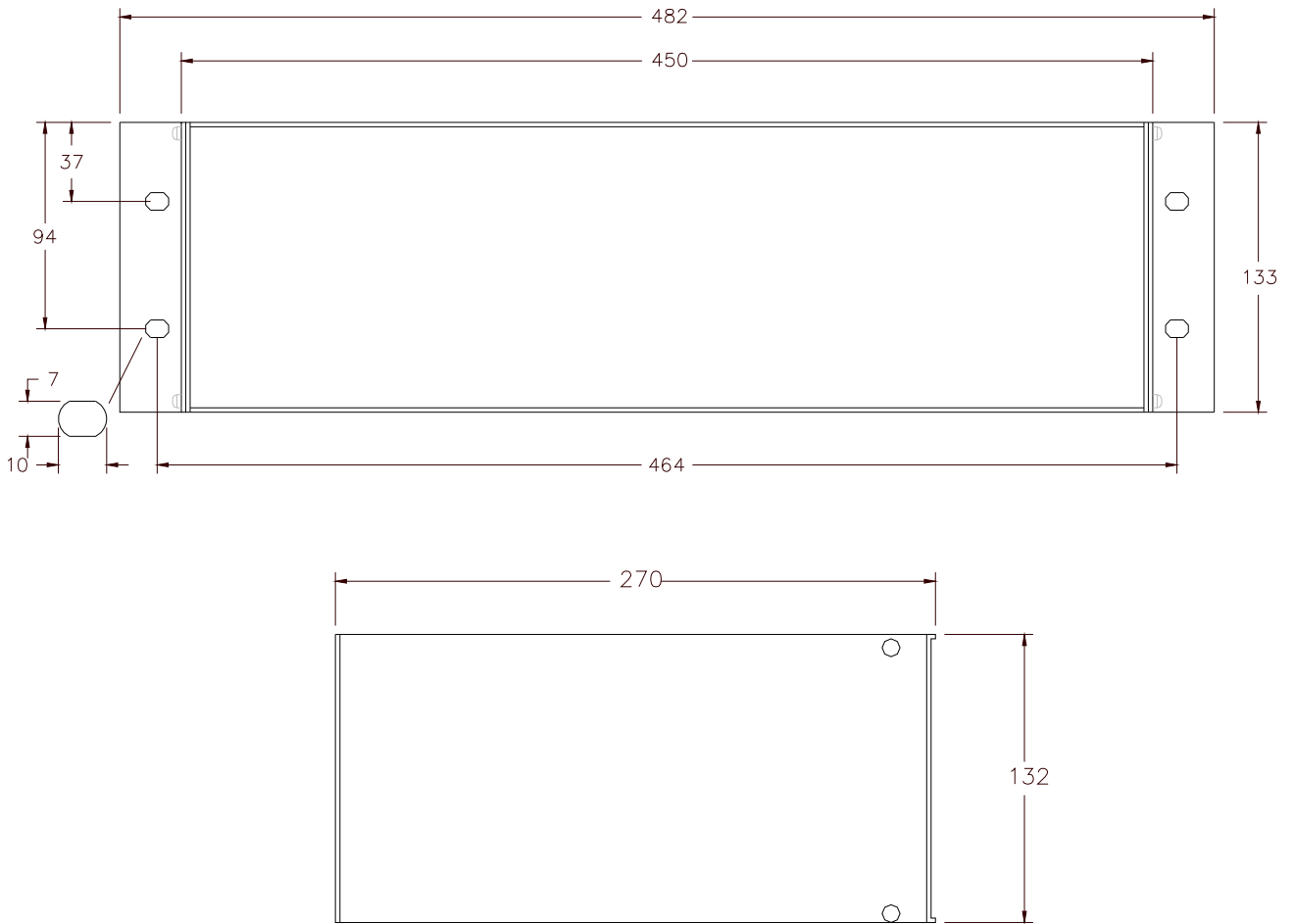
### 7.7 K1/K3, OTM unit connected to slot RS1 or RS2

T1-RSx	1 ●	PT-100 Sensor channel 1, positive
T2-RSx	2 ●	PT-100 Sensor channel 1, compensation
T3-RSx	3 ●	PT-100 Sensor channel 1, negative
T4-RSx	4 ●	PT-100 Sensor channel 2, positive
T5-RSx	5 ●	PT-100 Sensor channel 2, compensation
T6-RSx	6 ●	PT-100 Sensor channel 2, negative
		Cable shields connect to ground plate

### 7.8 K2/K4, OTM unit connected to slot RS1 or RS2

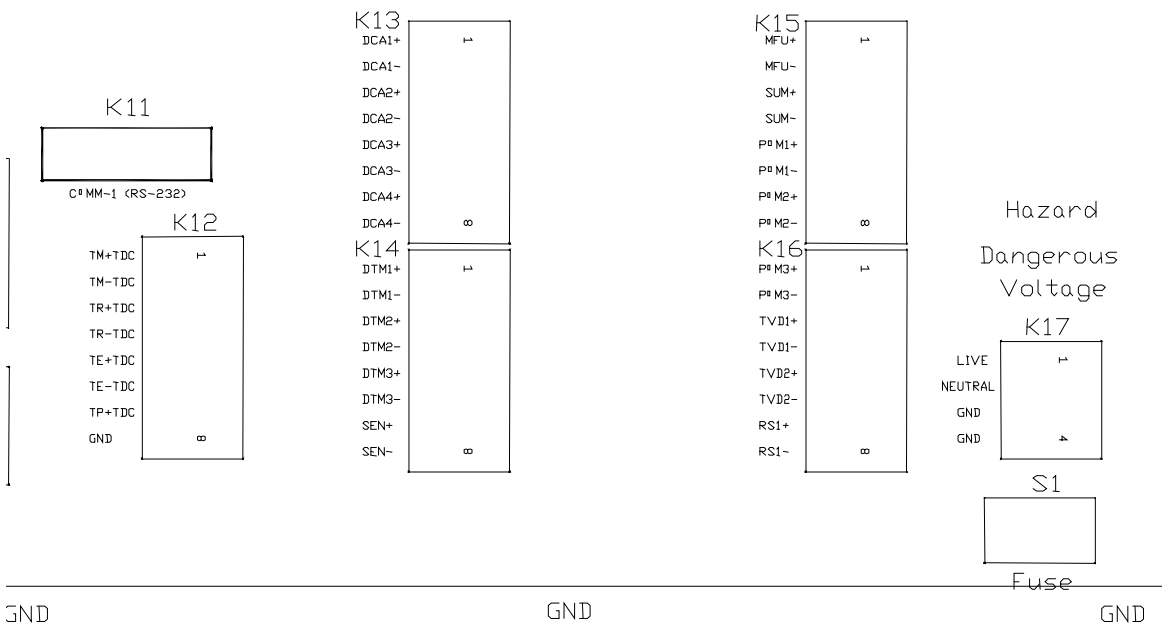
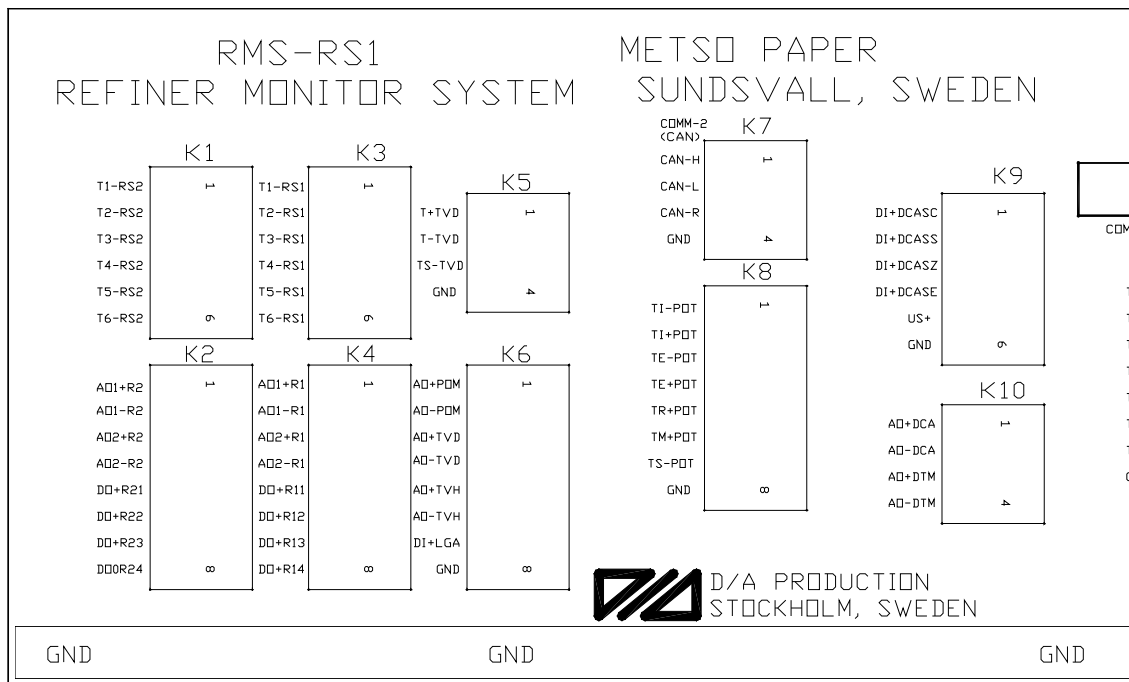
AO1+RSx	1 ●	Analogue output channel 1 +, 4-20 mA
AO1-RSx	2 ●	Analogue output channel 1 -, 4-20 mA
AO2+RSx	3 ●	Analogue output channel 2 +, 4-20 mA
AO2-RSx	4 ●	Analogue output channel 2 -, 4-20 mA
DO+Rx1	5 ●	Digital output, channel 1, Limit 1
DO+Rx2	6 ●	Digital output, channel 1, Limit 2
DO+Rx3	7 ●	Digital output, channel 2, Limit 1
DO+Rx4	8 ●	Digital output, channel 2, Limit 2

8 CONTOUR BLUEPRINT





9 WIRING DIAGRAM



10 CONTACT

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